IBMYP Year 5

Year 10 Mathematics

Practice Pattern Investigation
Diagonal Matrix

Terminologies:

A **Diagonal Matrix** is a square matrix in which the entries outside the main diagonal are all zero.
Order = number of rows by number of columns

Below are some examples of matrix operations you are familiar with. Make sure you are able to perform these types of matrix arithmetic operations, both manually and with a GDC!

$$\begin{pmatrix}2 & 3 & 4\end{pmatrix}\begin{pmatrix}5\\6\\7\end{pmatrix} = \begin{pmatrix}56\end{pmatrix}$$

$$\begin{pmatrix}1 & 0\\0 & 1\end{pmatrix}\begin{pmatrix}2 & 0\\0 & 2\end{pmatrix} = \begin{pmatrix}2 & 0\\0 & 2\end{pmatrix}$$

$$\begin{pmatrix}2 & 0\\0 & 2\end{pmatrix}^{-1} = \begin{pmatrix}0.5 & 0\\0 & 0.5\end{pmatrix}$$

1. Consider the diagonal matrix $\begin{pmatrix}5 & 0\\0 & 2\end{pmatrix}$. Find its inverse.

2. Consider the diagonal matrix $\begin{pmatrix}3 & 0\\0 & 11\end{pmatrix}$. Find its inverse.

3. What would be the inverse of the matrix $\begin{pmatrix}a & 0\\0 & b\end{pmatrix}$ where a and b are constants?

4. Given the inverse of $\begin{pmatrix}a & 0\\0 & b\end{pmatrix}$ exist. What do you know about a and b? Justify your answer.

5. Try to generalize the pattern suggested above to a **diagonal matrix** of higher order. Justify your work.